RELATIONSHIP OF HERACLEUM LANATUM MICHX. OF NORTH AMERICA TO H. SPHONDYLIUM OF EUROPE

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The one species of *Heracleum* native to North America has generally been known as *H. lanatum* Michx. or sometimes by the invalid name *H. maximum* Bartr. It extends from Newfoundland and Labrador to Alaska and south to Georgia and California, and the name *H. lanatum* has also been applied to plants from eastern Asia. The European *H. sphondylium*, occasionally naturalised in North America, has been distinguished from the native plant mainly by its having pinnate, as distinct from ternate, leaves (see for examples Mathias & Constance 1945, Fernald 1950, Gleason 1953, Gleason & Cronquist 1963). However, in preparing an account of this genus for Flora Europaea (1968) I found it necessary to adopt a broad concept of the species *H. sphondylium* so as to include plants ranging from those with pinnate leaves through those with ternate leaves to others with simple leaves, and the status of the American *H. lanatum* is thus now called into question.

In order to comprehend the position of the American plant it is necessary to consider the pattern of variation of *H. sphondylium* in Europe, where the morphological range of variation of the species as now understood is remarkably wide. In the nineteenth century many species were described similar to *H. sphondylium* but differing in such characters as the segmentation, lobing and toothing of the leaves, the indumentum of various parts, the size and shape of the fruits and the colour of the flowers. A fairly average species concept in this group about the turn of the century is exemplified by Coste (1903) who recognised as species six such variants (excluding the very distinct *H. minimum* Lam.) from France alone. In the present century there has been an increasing awareness among European botanists that although extreme variants look very different they

are connected by intermediates and no clear-cut distinctions can be drawn between them. At the same time some variants do show a geographical correlation which may allow recognition of infraspecific taxa. The increasing tendency to 'lump' these variants may be traced through Briquet (1905) and (1924), Thellung (1924) and (1926) and Fournier (1946), all of whom give subspecific rank to major geographical variants. Others, however, have occasionally remained reluctant to adopt such a wide species concept.

My own examination of herbarium specimens and field populations certainly confirms that one cannot draw specific limits in this complex on the basis of leaf form. Typical *Heracleum sphondylium*, widespread and often abundant in north-west Europe, has most leaves pinnate with two or occasionally three pairs of lateral segments. Its juvenile leaves, however, are simple, and in mature plants there is a gradation from the pinnate leaves on the lower stem through ternate to reduced simple leaves below the inflorescence. Furthermore, in the British Isles many flowering populations include occasional plants in which even the largest leaves are only ternate and not pinnate. In the mountains of central and southern Europe many populations appear to be fairly constant in having ternate leaves, often occurring in more compact and dense stands, and are referred to subsp. *montanum* (Schleicher ex Gaudin) Briquet. In the Alpine valleys, however, where the species is often abundant, and in the Iberian peninsula, there is commonly a complete mixture of plants with pinnate leaves, ternate leaves, and all intermediate stages where the terminal segment is dissected to varying degrees. Such is the extent of these intermediate populations that one may question whether it is advisable to attempt to maintain two taxa at all, even at only subspecific level. On the higher mountains from the Pyrenees to the Balkan peninsula populations occur in which the leaves are simple, these plants being referred to subsp. *pyrenaicum* (Lam.) Bonnier & Layens, but again many intermediates connect these to plants with ternate leaves. Roughly one may think of the

species as showing a cline of variation from pinnate to simple leaves from lower to higher altitudes, but in the Italian Alps I have observed the whole range of leaf form within a distance of less than half a mile.

Examination of herbarium specimens of *H. lanatum* from North America shows that it is fairly constant in having ternate leaves but is indistinguishable in leaf form from European plants referred to *H. sphondylium* subsp. *montanum*. Seymour (1969) has recently quoted fruit characters as well as leaf form to separate the American plant from *H. sphondylium*, but in the wide range of the latter in Europe plants with fruit matching those of *H. lanatum* are commonly found. I can, in fact, find no character to distinguish the American plant from *H. sphondylium* subsp. *montanum* and am obliged to reduce the name *H. lanatum* to synonymy:

H. sphondylium L. subsp. **montanum** (Schleicher ex Gaudin) Briquet in Schinz & R. Keller, Fl. Schweiz. ed. 2, **1**: 372 (1905).

H. montanum Schleicher [Cat. Pl. Helv. ed. 4, 19 (1821) nom. nud.] ex Gaudin, Fl. Helv. 2: 319 (1828), basionym.

H. maximum Bartr., Trav. 344 (1791), nom. invalid.

H. lanatum Michx., Fl. Bor. Am. **1**: 166 (1803), synon. nov.

H. douglasii DC., Prodr. 4: 193 (1830), synon. nov.

It may be appropriate here to recall the arguments for and against use of the name *H. maximum* Bartr. which is used in some current Floras. Adoption of this name was recommended by Fernald (1944) since it clearly ante-dated *H. lanatum* Michx., but this was soon refuted by Rickett (1944) who pointed out that Bartram had failed to consistently adopt the Linnaean binary system of nomenclature and that none of his names could therefore be considered validly published. In a foot-note to Rickett's paper Fernald gladly concurred with this opinion but, peculiarly, later (1950) stuck to using *H. maximum* Bartr. This has been followed by Seymour (1969) but is incorrect even if

one were to maintain the American plant as a species distinct from *H. sphondylium*.

It may be questioned whether *montanum* is the earliest and correct epithet for this taxon at subspecific rank, for Bisse (1963) has adopted the name *H. sphondylium* subsp. *elegans* (Crantz.) Arcangeli, with subsp. *montanum* as a synonym of this. The name *H. sphondylium* subsp. *elegans* was certainly published by Arcangeli in the second edition of his Compendio della Flora Italiana, p. 612 (1894), but he cited no authority after the epithet, a most unusual omission in this work. In the first edition (1882) he had recognised a species "*H. elegans* Willd., sp. 1, p. 2a, 1422" immediately before *H. sphondylium*, and this name does not appear in the second edition. Willdenow, however, referred back to *H. elegans* of Jacquin (1774), who in turn had taken up the epithet from Crantz (1769), who here published it as *H. protheiforme* "δ *Elegans* aut *Problematicum*" (the note following clearly indicating that he intended this to be a variety) but had earlier (1767) given it simply as "δ *Elegans*". The type of Crantz's name I take to be the plate, tab. 2, in his 1767 work, reproduced again in 1769, despite his mention of a still earlier figure by Jacquin dating from 1762. Crantz's plate shows a plant, said to be from Schneeberg in Austria, with three simple leaves (albeit divided almost to the base) and one ternate leaf, apparently a narrow-leaved variant intermediate between what I have above referred to as subsp. *pyrenaicum* and subsp. *montanum*, though certainly closer to the former. On the other hand the plant figured as *H. elegans* by Jacquin (1774) is different, the larger of the two leaves being ternate but tending towards pinnate, the smaller leaf being clearly ternate, the segments of both leaves being very narrow as is not infrequently found in several subspecies of *H. sphondylium*. Now it seems to me that the connection between Arcangeli's subsp. *elegans* of 1894 and Crantz's var. *elegans* of 1767-9 is too tenuous for them to be regarded as homotypic nomenclatural synonyms. Certainly the plants described by the two authors under the epithet *elegans* are

different, for Arcangeli's *elegans* of both 1882 and 1894 are said to have pinnatisect leaves and are presumably only the narrow-leaved variant of subsp. *sphondylium*. Because of the omission of any former authority by Arcangeli in 1894, coupled with the fact that his plant is apparently taxonomically different from any former *elegans*, I regard *H. sphondylium* subsp. *elegans* Arcangeli 1874 as a new name. In any case, it seems that neither Crantz's plant nor Arcangeli's is taxonomically the same as the ternate-leaved subsp. *montanum*, although the plant figured by Jacquin as *H. elegans* may be an abnormal form of this.

H. sphondylium now seems to be a polymorphic species distributed through most of the north-temperate region but showing its greatest variation in Europe (from where a fairly conservative nine subspecies are recognised in Flora Europaea). Subsp. *montanum* is the most widespread form of the species, extending across North America, Siberia (where it has been known as *H. dissectum* Ledeb.) and the mountains of central and southern Europe. In Europe it is morphologically and roughly eco-geographically intermediate between subsp. *sphondylium*, with which it merges very widely at lower altitudes, and subsp. *pyrenaicum* into which it intergrades at higher altitudes. The European plant introduced in North America is *H. sphondylium* subsp. *sphondylium*.

Plants from Japan and China which have been variously referred to *H. lanatum*, *H. moellendorfianum* Hance or *H. barbatum* Ledeb. seem also to be certainly referable to *H. sphondylium* in the broad sense, some of them probably to subsp. *montanum*, though others having pinnate leaves should presumably be excluded from this subspecies. Hiroe (1958) recognises from Asia, excluding Japan, *H. lantaum* with ternate leaves and *H. sphondylium* with pinnate leaves, which may correspond to subsp. *montanum* and subsp. *sphondylium* respectively. Hiroe & Constance (1958) refer all Japanese plants of this complex to *H. lanatum* but describe it as having leaves ternately, ternately-pinnately or quinately divided. As these authors point out, further

elucidation of the pattern of variation in this complex in Asia is required.

Postcript. In commenting above on usage of the name *Heracleum maximum* Bartram I accepted the view of Rickett that Bartram's binomials were not validly published because he did not consistently adopt binary nomenclature for species. While my article was in press a paper by Robert L. Wilbur, 'A reconsideration of Bartram's binomials', was published in *J. Elisha Mitchell Sci. Soc.*, 87(2): 56-73 (1971), putting forward again the view that Bartram's binomials should be accepted. Wilbur quotes an important paper by E. D. Merrill which I had overlooked, 'In defence of the validity of William Bartram's binomials', in *Bartonia*, 23: 10-35 (1945), where Merrill argues that out of 360 plant names used by Bartram all but one or perhaps two may be interpreted as binomials, even though many of these may have been followed by descriptive latin phrases separated only by a comma. This paper by Merrill may now be seen to explain the *volte face* of Fernald over usage of the name *Heracleum maximum* which I have commented on above, and justifies Seymour's adoption of the name in preference to *H. lanatum* Michx. After studying Wilbur's and Merrill's papers I am now convinced that Bartram's names should in general be accepted as validly published; in the case of *Heracleum maximum* the descriptive matter given by Bartram is so scant that it might be regarded as a *nomen subnudum*, but I would allow that it is just sufficient for validation of the name. This postscript does not, however, change my opinion that the correct name for the American plant is *H. sphondylium* subsp. *montanum*.

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